

15260
Trench Soil
610.5 grams

DRAFT



Figure 1: Apollo 15 trench, station 6. AS15-86-11643. Sample 15260 was collected from bottom of this trench (~25 cm). The legs on the gnomon are 50 cm.

Introduction

Soil samples 15260 and 15012 were collected from the bottom of a small trench at station 6, Apollo 15 (Swann et al. 1972). 15012 was placed in a special environmental sample container (SESC) and was sealed. Morris et al. (1983) state that this trench was only 10 cm deep, but the picture looks more like 20-25 cm deep (figure 1). The trench was dug on the rim of a crater about 12 meters across.

Petrography

15260 is a mature soil with $Is/FeO = 77$ (Morris 1978) with agglutinate content ~ 50% (McKay et al. unpublished). Walker and Papike (1981) calculate that this soil is made up of 28 % mare basalt, 18 % LKFM, ~14 % anorthosite, ~25 % KREEP and ~17 % mafic green glass.

Modal content of soils 15260. *From Morris et al. 1983.*

	15260
Agglutinates	50.5
Basalt	4
Breccia	8.5
Anorthosite	0.5
Norite	
Gabbro	
Plagioclase	0.5
Pyroxene	14
Olivine	2.5
Ilmenite	-
Glass other	19

Best and Minkin (1972) and Warner et al. (1972) studied the composition of glass beads in 15261. Goldstein and Axon (1972) and Axon and Goldstein (1972) analyzed metallic iron grains in this sample (figure 2). Simon et al. (1987) described a sample of KREEP basalt (15263,42) found as a “coarse-fine” particle in this trench.

Chemistry

Taylor et al. (1973), Korotev (1987), Duncan et al. (1975) and others have analyzed 15260 (table 1, figures 3 and 4). Kaplan et al. (1976) determined the C, N and S content (156 ppm, 106 ppm and 700 ppm respectively). This soil has a carbon content consistent with its maturity (figure 5).

Cosmogenic isotopes and exposure ages

Rancitelli et al. (1972) determined the cosmic ray induced activity of ^{22}Na = 37 dpm/kg. and ^{26}Al = 50 dpm/kg. Fireman et al. (1972) reported on ^{37}Ar , ^{39}Ar and ^{3}H (tritium) found in 15261 stating that “*the solar-flare intensity averaged over 30 yr obtained from the tritium depth dependence was approximately the same as the flare intensity averaged over 1000 yr obtained from ^{39}Ar measurements.*”

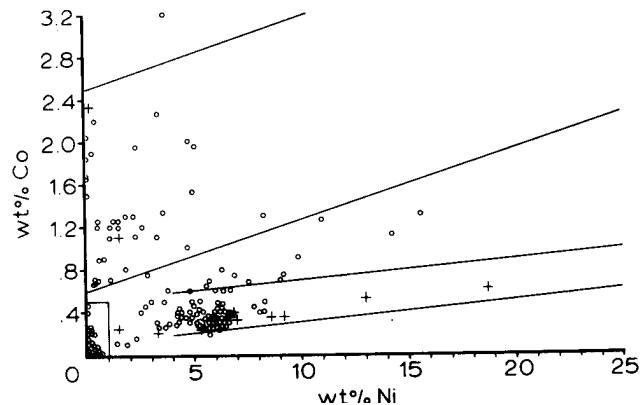


Figure 2: Ni and Co content of iron grain from 15261 (from Goldstein and Axon 1972).

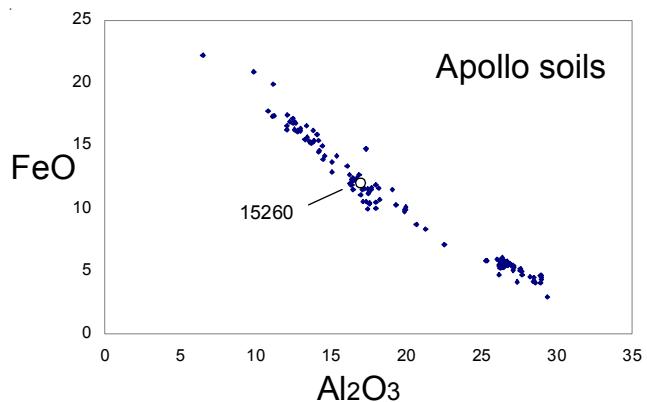


Figure 3: Chemical composition of lunar soils.

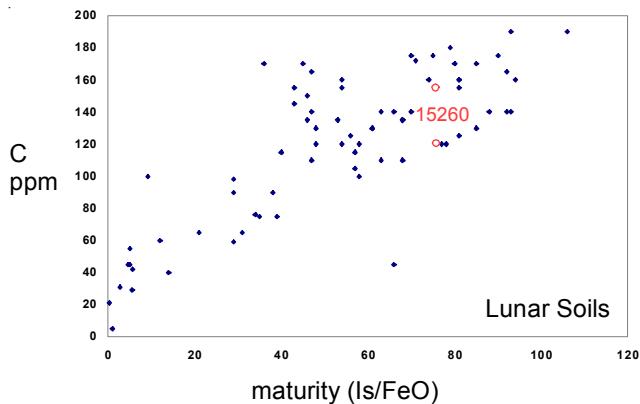


Figure 5: Carbon content and maturity for lunar soils. Data from Kaplan et al. (1976), Moore (1974) and Morris (1977).

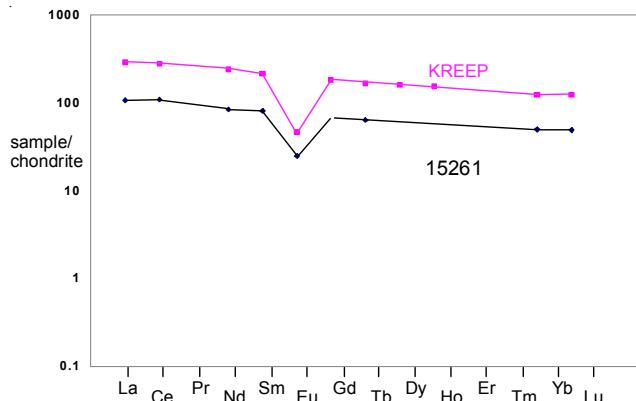


Figure 4: Normalized rare-earth-element diagram for trench soil 15261 and one of the coarse-fine particles found in it (KREEP).

Other Studies

Holland et al. (1972) studied the temperature release (pyrolysis) of soil 15261 for various molecular species (figure 6).

Processing

This is a relatively large soil sample for Apollo 15, especially when you consider the added amount in the SESC container (see 15012).

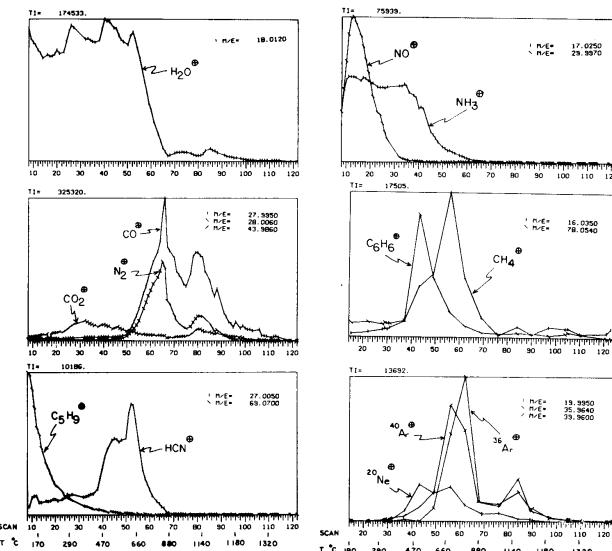


Figure 6: Volatile release curves for 15261 (from Holland et al 1972).

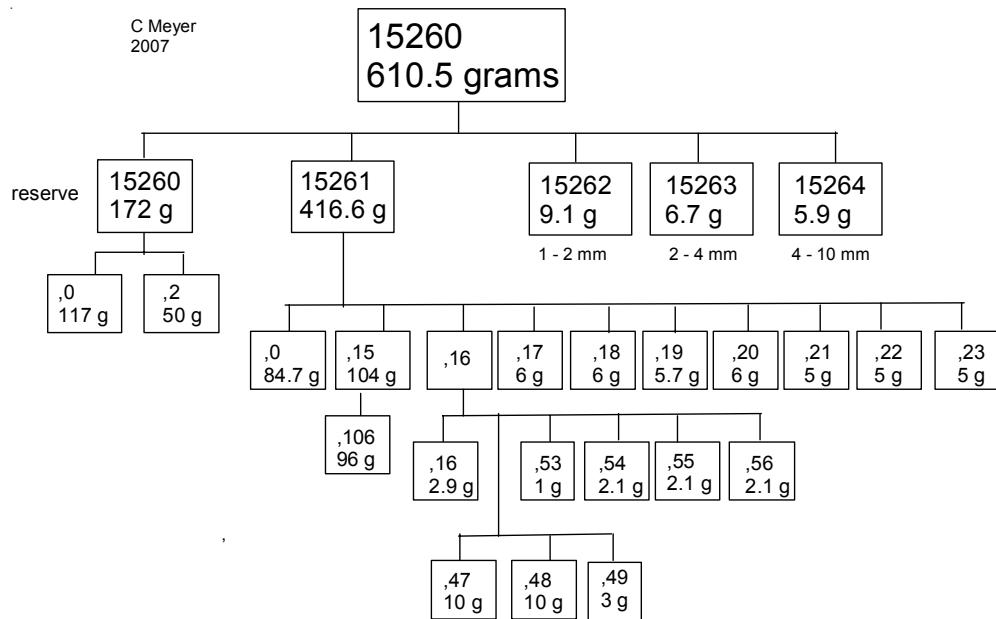


Table 1. Chemical composition of 15260.

reference weight	Korotev87	Taylor 73	Duncan75	Brunffelt72	Hughes72	Rancitelli72	KREEP basalt Simon 87 15263,42
SiO ₂ %			46.35 (b)				
TiO ₂	1.5 (a)		1.5 (b)	1.4 (a)			1.7 (a)
Al ₂ O ₃	16.4 (a)		16.4 (b)	16.1 (a)			15.3 (a)
FeO	12.3 (a)		12.28 (b)	12.1 (a)			9.9 (a)
MnO	0.16 (a)		0.159 (b)	0.16 (a)			0.14 (a)
MgO	10.7 (a)		10.71 (b)				9.6 (a)
CaO	11 (a)		11.15 (b)	11.89 (a)			9.4 (a)
Na ₂ O	0.44 (a)		0.39 (b)	0.44 (a)			0.74 (a)
K ₂ O			0.19 (b)		0.2 (d)		0.54 (a)
P ₂ O ₅			0.219 (b)				
S %			0.084 (b)		0.089 (c)		
<i>sum</i>							
Sc ppm	23.8 (a)			23.3 (a)			20.2 (a)
V		81	(b)	131 (a)			65 (a)
Cr	2260 (a)		2347 (b)	2450 (a)			2429 (a)
Co	40.9 (a)		42 (b)	44.6 (a)			20.4 (a)
Ni	247 (a)		250 (b)	300 (a)			
Cu		11	(b)	7 (a)			
Zn		26	(b)	19 (a)			
Ga				4.5 (a)			
Ge ppb							
As				0.16 (a)			
Se				0.37 (a)	0.38 (c)		
Rb	3.5 (a)	(e) 6	(b)	6.9 (a)			
Sr	150 (a)	136 (e)	131 (b)			230 (a)	
Y	67 (a)	80.7 (e)					
Zr	330 (a)	356 (e)	382 (b)			880 (a)	
Nb		19.8 (e)	24.8 (b)				
Mo							
Ru							
Rh							
Pd ppb							
Ag ppb			45 (a)	16 (a)	16 (c)		
Cd ppb							
In ppb			39 (e)				
Sn ppb	0.6 (a)						
Sb ppb							
Te ppb							
Cs ppm	0.29 (a)			0.27 (a)			
Ba	251 (a)	307 (e)	260 (b)	231 (a)		750 (a)	
La	25.4 (a)	22 (e)		22 (a)		68 (a)	
Ce	66 (a)	61 (e)		92 (a)		170 (a)	
Pr		7.73 (e)					
Nd	38 (a)	32.2 (e)				110 (a)	
Sm	11.9 (a)	11.3 (e)		12.8 (a)		31.6 (a)	
Eu	1.39 (a)	1.5 (e)		1.6 (a)		2.6 (a)	
Gd		11.5 (e)				36 (a)	
Tb	2.33 (a)	1.99 (e)		2.3 (a)		6.1 (a)	
Dy		14.2 (e)		12.7 (a)		39 (a)	
Ho		3.27 (e)		2 (a)		8.6 (a)	
Er		9.3 (e)		7 (a)			
Tm		1.4 (e)				3.1 (a)	
Yb	8.1 (a)	8.75 (e)		2.5 (a)		20.4 (a)	
Lu	1.2 (a)	1.4 (e)		0.76 (a)		3.05 (a)	
Hf	9.2 (a)	7.1 (e)		12.2 (a)		22.7 (a)	
Ta	1.13 (a)			1.02 (a)		2.8 (a)	
W ppb		5200 (e)		1300 (a)			
Re ppb				0.8 (c)			
Os ppb				7.5 (c)			
Ir ppb	7.5 (a)			7.4 (a)	7 (c)		
Pt ppb							
Au ppb	107 (a)			5.5 (a)	4.1 (c)		
Th ppm	4.2 (a)	4.12 (e)		3.6 (a)		4.64 (d)	12 (a)
U ppm	1.13 (a)	1.08 (e)		1.14 (a)		1.18 (d)	3.3 (a)

technique: (a) INAA, (b) XRF, (c) RNAA, (d) radiation counting, (e) Spark source mass spec.

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